

## **DETAILED ACTION**

### ***Response to Amendment***

Applicant's amendment to the claims, filed on September 22, 2009, is acknowledged. Entry of amendment is accepted and made of record. Currently, claims 16 – 28 are pending in light of the amendment, in which: claims 16 and 19 – 20 were amended; claims 1 – 15 and 29 – 32 were cancelled; no claim was withdrawn; and no claim was added.

Applicant's amendment to the specification, filed on May 22, 2009, is acknowledged. Entry of amendment is accepted and made of record.

### ***Response to Arguments/Remarks***

Applicant's response filed on May 22, 2009 is acknowledged and are answered as follows.

Applicant's remarks, see pg. 6, with respect to specification have been fully considered and are persuasive. Therefore, the objection to the specification has been rendered moot.

Applicant's remarks, see pg. 6, with respect to the rejections under 35 U.S.C. § 112 have been fully considered and are persuasive. Therefore, the rejections have been rendered moot.

Applicant's arguments, see pgs. 6 – 8, with respect to the rejections under 35 U.S.C. § 102 and § 103 have been fully considered and are persuasive. Therefore, the

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rejections have been rendered moot. However, upon further consideration, new grounds of rejections are made in view of newly discovered prior art.

### ***Information Disclosure Statement***

The information disclosure statement (IDS) submitted on March 12, 2009 is being considered by the examiner. However, 3<sup>rd</sup> reference within the IDS, namely WO 00/23376 has not been considered because it has failed to meet 37 C.F.R. § 1.98(a)(2). The examiner believes that there was no indication of such reference to be considered was ever provided or any reason that it was not provided.

### ***Claim Objections***

Claim 22 objected to because of the following informalities: at line 2, the claim recites "1nm". There should be a space between "1" and "nm". For instance, see claim 21. Appropriate correction is required.

### ***Claim Rejections - 35 USC § 102***

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States

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only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claims 16 and 20 – 23 are rejected under 35 U.S.C. 102(b) as being anticipated by Kwansnick *et al.* (U.S. Pat. No. 5, 233,181), hereinafter as Kwansnick.

Regarding claim 16, fig. of Kwansnick discloses a layer system, comprising:

an etched layer, whereby the etched layer is a silicon layer (ref. 120; col. 4, lines 24 – 42); and

a passivation layer (ref. 130) applied at least regionally to a surface of the silicon layer (ref. 122; as seen in fig.), wherein:

the passivation layer includes a first, at least largely, inorganic partial layer (ref. 132) and a second partial layer (ref. 134), and

the second partial layer is made of an organic compound (col. 5, lines 34 – 36).

Regarding claim 20, Kwansnick discloses the layer system as recited in Claim 16, Kwansnick discloses wherein the first partial layer is at least largely composed of an oxide layer including having a silicon oxide (abstract, lines 6 – 7).

Regarding claim 21, Kwansnick discloses the layer system as recited in Claim 16, Kwansnick discloses wherein the first partial layer has a thickness of 1 nm to 100 nm (col. 4, lines 53 – 55).

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Regarding claim 22, Kwansnick discloses the layer system as recited in Claim 16, Kwansnick discloses wherein the first partial layer has a thickness of 1nm to 20 nm (col. 4, lines 53 – 55).

Regarding claim 23, Kwansnick discloses the layer system as recited in Claim 16, Kwansnick discloses wherein the first partial layer is directly applied one of (a) to the silicon layer (region of ref. 122, as seen in fig.) and (b) on a layer of silicon oxide situated on the silicon layer.

### ***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of

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the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Claims 16, 18 and 23 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hong *et al.* (U.S. Pat. App. Pub. No. 2003/0013272 A1), hereinafter as Hong.

Regarding claim 16, figs. 1 – 2 of Hong discloses a layer system, comprising:

an etched layer (ref. 10 having ref. 30; ¶6), whereby the etched layer is a silicon layer (¶6 discloses a semiconductor substrate, but does not specify the material thereof. It is well known in the art that silicon is a known material to be used as a semiconductor substrate; see M.P.E.P. § 2144.07); and

a passivation layer (refs. 40 and 50) applied at least regionally to a surface of the silicon layer (as seen in fig. 2), wherein:

the passivation layer includes a first, at least largely, inorganic partial layer (ref. 40; ¶6) and a second partial layer (ref. 50), and

the second partial layer is made of an organic compound (¶11).

Regarding claim 18, Hong discloses the layer system as recited in Claim 16, wherein:

the organic compound includes a silane corresponding to one of an organic fluorine silane, an organic fluorochlorine silane, and a siloxane.

Regarding claim 23, Hong discloses the layer system as recited in Claim 16, wherein the first partial layer is directly applied one of (a) to the silicon layer (as seen in fig. 2) and (b) on a layer of silicon oxide (on the bottom of ref. 70) situated on the silicon layer (as seen in fig. 2).

Claim 17 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kwansnick as applied to claim 16 above, and further in view of Furuya *et al.* (Fluorinated polyimide fabrication by magnetically controlled reactive ion etching), hereinafter as Furuya.

Regarding claim 17, Kwansnick discloses the layer system as recited in Claim 16, but Kwansnick may not disclose the following limitation whereas the abstract of Furuya discloses it is known in the art to provide wherein the organic compound contains a halogen. It would have been obvious to one having ordinary skill in the art at the time the invention was made to provide the invention of Kwansnick with the fluorinated polyimides having fluorine concentrations of Furuya, in order to control etching rate in a magnetically controlled reactive ion etching process and provide smooth surface morphology (abstract of Furuya).

Claims 25 – 26 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kwansnick as applied to claim 16 above.

Regarding claim 25, Kwansnick discloses the layer system as recited in Claim 16, but Kwansnick may not disclose the following limitation whereas one of ordinary skill in the art would have been capable of providing wherein the second partial layer has a thickness of 0.5 nm to 30 nm. In view of M.P.E.P. § 2144.05(I), it states:

*“In re Geisler*, 116 F.3d 1465, 1469-71, 43 USPQ2d 1362, 1365-66 (Fed. Cir. 1997) (Claim reciting thickness of a protective layer as falling within a range of “50 to 100 Angstroms” considered *prima facie* obvious in view of prior art reference teaching that “for suitable protection, the thickness of the protective layer should be not less than about 10 nm [i.e., 100 Angstroms].” The court stated that “by stating that suitable protection’ is provided if the protective layer is about’ 100 Angstroms thick, [the prior art reference] directly teaches the use of a thickness within [applicant’s] claimed range.”). Similarly, a *prima facie* case of obviousness exists where the claimed ranges and prior art ranges do not overlap but are close enough that one skilled in the art would have expected them to have the same properties.”

Col. 5, lines 34 – 44 of Kwansnick discloses an example that the organic dielectric layer 134 having a thickness of between about 0.5 micron and 2.5 microns, the thickness selected to provide the desirable passivation layer characteristics, including providing sufficient separation between the top contact layer to limit the capacitance. *Ergo*, while Kwansnick expresses a preference of an illustrated thickness, at the same time it provides the motivation for one of ordinary skill in the art to focus on thickness levels at the lower end of Kwansnick suitable range and to explore thickness levels below that range to provide desirable passivation layer characteristics, including

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providing sufficient separation between the top contact layer to limit the capacitance, which may arrive at a thickness of 0.5 nm to 30 nm.

Regarding claim 26, Kwansnick discloses the layer system as recited in Claim 16, but Kwansnick may not disclose the following limitation whereas one of ordinary skill in the art would have been capable of providing wherein the second partial layer has a thickness of 5 nm to 20 nm. In view of M.P.E.P. § 2144.05(I), it states:

*"In re Geisler*, 116 F.3d 1465, 1469-71, 43 USPQ2d 1362, 1365-66 (Fed. Cir. 1997) (Claim reciting thickness of a protective layer as falling within a range of "50 to 100 Angstroms" considered prima facie obvious in view of prior art reference teaching that "for suitable protection, the thickness of the protective layer should be not less than about 10 nm [i.e., 100 Angstroms]." The court stated that "by stating that suitable protection' is provided if the protective layer is about' 100 Angstroms thick, [the prior art reference] directly teaches the use of a thickness within [applicant's] claimed range."). Similarly, a *prima facie* case of obviousness exists where the claimed ranges and prior art ranges do not overlap but are close enough that one skilled in the art would have expected them to have the same properties."

Col. 5, lines 34 – 44 of Kwansnick discloses an example that the organic dielectric layer 134 having a thickness of between about 0.5 micron and 2.5 microns, the thickness selected to provide the desirable passivation layer characteristics, including providing sufficient separation between the top contact layer to limit the capacitance. *Ergo*, while Kwansnick expresses a preference of an illustrated thickness, at the same time it provides the motivation for one of ordinary skill in the art to focus on thickness levels at the lower end of Kwansnick suitable range and to explore thickness levels below that range to provide desirable passivation layer characteristics, including

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providing sufficient separation between the top contact layer to limit the capacitance, which may arrive at a thickness of 5 nm to 20 nm.

Claims 27 – 28 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kwansnick as applied to claim 16 above, and further in view of Laermer *et al.* (U.S. Pat. App. Pub. No. 2006/0108576 A1), hereinafter as Laermer.

Regarding claim 27, Kwansnick discloses the layer system as recited in Claim 16, but Kwansnick may not disclose the following limitation whereas one of ordinary skill in the art would have recognized wherein the passivation layer protects the silicon layer with respect to an etch attack by a gaseous halogen fluoride including one of  $\text{ClF}_3$  and  $\text{BrF}_3$ . ¶4 of Laermer discloses that it is known in the art that silicon oxide is capable of withstanding a chlorine trifluoride ( $\text{ClF}_3$ ) etch attack. Kwansnick discloses that the passivation layer (ref. 130) comprises a silicon oxide layer (ref. 132; abstract, lines 6 – 7). In view of M.P.E.P. § 2144.07, the selection of a known material based on its suitability for its intended use supported a *prima facie* obviousness.

Furthermore, a recitation of the intended use of the claimed invention must result in a structural difference between the claimed invention and the prior art in order to patentably distinguish the claimed invention from the prior art. If the prior art structure is capable of performing the intended use, then it meets the claim. In essence, apparatus claims cover what a device is, not what a device does. See M.P.E.P. § 2112.01 and § 2114.

Regarding claim 28, Kwansnick discloses the layer system as recited in Claim 16, but Kwansnick may not disclose the following limitation whereas one of ordinary skill in the art would have recognized wherein the passivation layer is free of micro-scale or nano-scale channels which are permeable for a gas including one of  $\text{ClF}_3$ ,  $\text{BrF}_3$  and a vapor. ¶4 of Laermer discloses that it is known in the art that silicon oxide is capable of withstanding a chlorine trifluoride ( $\text{ClF}_3$ ) etch attack. ¶10 of Laermer discloses that an etch attack, such as  $\text{ClF}_3$ , would cause undesirable micro-scale or nano-scale channels. *Ergo, inter alia*, silicon oxide withstanding a  $\text{ClF}_3$  etch attack would lead to the possibility of no micro-scale or nano-scale channels. Kwansnick discloses that the passivation layer (ref. 130) comprises a silicon oxide layer (ref. 132; abstract, lines 6 – 7). In view of M.P.E.P. § 2144.07, the selection of a known material based on its suitability for its intended use supported a *prima facie* obviousness.

Furthermore, a recitation of the intended use of the claimed invention must result in a structural difference between the claimed invention and the prior art in order to patentably distinguish the claimed invention from the prior art. If the prior art structure is capable of performing the intended use, then it meets the claim. In essence, apparatus claims cover what a device is, not what a device does. See M.P.E.P. § 2112.01 and § 2114.

Claims 16 and 24 are rejected under 35 U.S.C. 103(a) as being unpatentable over Obeng *et al.* (U.S. Pat. No. 6,323,131 B1), hereinafter as Obeng, and further in view of Jeng (Euro. Pat. App. Pub. No. 0 822 586 A2) and Hong.

Regarding claim 16, fig. 1c of Obeng discloses a layer system, comprising:  
an etched layer, whereby the etched layer is a silicon layer (ref. 12; see note 1 below); and

a passivation layer (refs. 10 and/or 24, and 18) applied at least regionally to a surface of the silicon layer (as seen in fig. 1c), wherein:

the passivation layer includes a first, at least largely, inorganic partial layer (ref. 10) and a second partial layer (refs. 10 and/or 24), and

the second partial layer is made of an organic compound (col. 4, lines 9 – 35).

Note 1: Col. 4, line 12 of Obeng discloses ref. 12 is a silicon layer. However, Obeng does not disclose that the silicon substrate is etched. Col. 1, lines 1 – 25 of Obeng discloses that it is known in the art that interconnects overlie an active substrate in an ultra high scale integration integrated circuits. Jeng discloses in fig. 5 and at pg. 2, lines 5 – 9 that the disclosure relates to integrated circuits with a silicon substrate 10 with transistors 34, and that the silicon substrate is provided with isolation trenches 30. Isolation trenches are etched in the silicon substrate is known in the art, for instance, see figs. 1 – 2 of Hong, as rejected above in claim 16 by Hong. *Ergo*, it would have been obvious to one of ordinary skill in the art to provide ref. 12 of Obeng containing etched silicon comprising isolation trenches that separates active devices. In view of

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M.P.E.P. § 2144.07, the selection of a known material based on its suitability for its intended use supported a *prima facie* obviousness.

Regarding claim 24, Obeng, Jeng and Hong disclose the layer system as recited in one Claim 16, wherein the second partial layer is a self-assembled monolayer (col. 2, lines 51 – 57).

### ***Allowable Subject Matter***

Claim 19 is allowed.

The following is an examiner's statement of reasons for the indication of allowable subject matter: The cited art, whether taken singularly or in combination, especially when all limitations are considered within the claimed specific combination, fails to teach or render obvious a layer system, *inter alia*, as recited in claim 19.

### ***Conclusion***

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. JP08-288382, disclosing materials generally related to the claimed invention.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Hoang-Quan T. Ho whose telephone number is (571)272-8711. The examiner can normally be reached on Monday - Friday, 9 AM - 5 PM, EST.

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If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Steven Loke can be reached on 571-272-1657. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Hoang-Quan T Ho/  
Examiner, Art Unit 2818  
December 17, 2009